American Falls Subbasin Total Maximum Daily Load Plan: Subbasin Assessment and Loading Analysis

Draft

Idaho Department of Environmental Quality
Shoshone-Bannock Tribes
U. S. Environmental Protection Agency

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Abbreviations, Acronyms, and Symbols

303(d), §303(d) Refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired waterbodies required by this section

***u*(µ)** micro, one-one millionth

***u*S/cm** microSiemens/centimeter

§ Section (usually a section of federal or state rules or statutes)

ac-ft acre foot (feet)

ADB assessment database

avg average

AWS agricultural water supply

BAG Basin Advisory Group

BLM United States Bureau of Land Management

BMP best management practice

BOD biochemical oxygen demand

BOR United States Bureau of Reclamation

Btu British thermal unit

BURP Beneficial Use Reconnaissance Program

C Celsius

CFR Code of Federal Regulations (refers to citations in the federal administrative rules)

cfs cubic foot (feet) per second

chl *a* chlorophyll *a*

cm centimeter(s)

CWA Clean Water Act

CWAL coldwater aquatic life

CWE cumulative watershed effects

DEQ Idaho Department of Environmental Quality

DO dissolved oxygen

DOI U.S. Department of the Interior

DWS domestic water supply

EC electro conductivity

EMAP Environmental Monitoring and Assessment Program

EPA United States Environmental Protection Agency

ESA Endangered Species Act

F Fahrenheit

FPA Idaho Forest Practices Act

FWS U.S. Fish and Wildlife Service

GIS Geographical Information Systems

HCO_3 bicarbonate

HUC Hydrologic Unit Code

I.C. Idaho Code

IDAPA Refers to citations of Idaho administrative rules

IDFG Idaho Department of Fish and Game

IDL Idaho Department of Lands

IDWR Idaho Department of Water Resources

in inch

INFISH The federal Inland Native Fish Strategy

IRIS Integrated Risk Information System

km kilometer

km^2 square kilometer

L liter

LA load allocation

LC load capacity

m meter

m^3 cubic meter

max maximum

MBI macroinvertebrate index

mg milligram

MGD million gallons per day

mg/L milligrams per liter

mi mile

mi^2 square miles

min minimum

mm millimeter

MOS margin of safety

MRCL multiresolution land cover

MWMT maximum weekly maximum temperature

N nitrogen

n.a. not applicable

NA not assessed

NB natural background

nd no data (data not available)

nda no date available

NFS not fully supporting

NH_3 ammonium

NO_2 nitrite

NO_3 nitrate

NPDES National Pollutant Discharge Elimination System

nr near

NRCS Natural Resources Conservation Service

NTU nephlometric turbidity unit

ORV off-road vehicle

ORW Outstanding Resource Water

P phosphorus

PACFISH The federal Pacific Anadromous Fish Strategy

PCR primary contact recreation

PFC proper functioning condition

PO_4 phosphate

ppm part(s) per million

QA quality assurance

QC quality control

RBP rapid bioassessment protocol

RDI DEQ's river diatom index

RFI DEQ's river fish index

RHCA riparian habitat conservation area

RMI DEQ's river macroinvertebrate index

RPI DEQ's river physiochemical index

SaSp salmonid spawning

SBA subbasin assessment

SCR secondary contact recreation

SFI DEQ's stream fish index

SHI DEQ's stream habitat index

SMI DEQ's stream macroinvertebrate index

SRP soluble reactive phosphorus

SS suspended sediment

SSC suspended sediment concentration

SSOC stream segment of concern

STATSGO State Soil Geographic Database

SU standard units

TDG total dissolved gas

TDS total dissolved solids

T&E threatened and/or endangered species

TIN total inorganic nitrogen

TKN total Kjeldahl nitrogen

TMDL total maximum daily load

TP total phosphorus

TS total solids

TSS total suspended solids

t/y tons per year

U.S. United States

U.S.C. United States Code

USDA United States Department of Agriculture

USDI United States Department of the Interior

USFS United States Forest Service

USGS United States Geological Survey

WAG Watershed Advisory Group

WBAG *Waterbody Assessment Guidance*

WBID waterbody identification number

WET whole effluence toxicity

WLA wasteload allocation

WQLS water quality limited segment

WQMP water quality management plan

WQRP water quality restoration plan

WQS water quality standard

WY water year (October to September)

TMDL at a Glance

Subbasin:	*American Falls*
HUC:	*17040206*
Key Resources:	*Coldwater Aquatic Life, Salmonid Spawning, Primary/Secondary Contact Recreation, Domestic & Agricultural Water Supply, Aesthetics, Wildlife Habitat*
Uses Affected:	*Coldwater Aquatic Life, Salmonid Spawning, Primary/Secondary Contact Recreation, Domestic Water Supply, Aesthetics*
Pollutants:	*Sediment, Nutrients, Bacteria, Dissolved Oxygen, Flow Alteration, Unknown*
Sources Considered:	*PS – wastewater treatment plants, fish hatcheries, stormwater* *NPS - agriculture, grazing, roads, urban*

Executive Summary

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and tribes, pursuant to Section 303 of the CWA are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize waterbodies that are water quality limited (i.e., waterbodies that do not meet water quality standards). States and tribes must periodically publish a priority list of impaired waters, currently every four years. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards. This document addresses the waterbodies in American Falls Subbasin that have been placed on what is known as the "303(d) list."

This subbasin assessment and TMDL analysis has been developed to comply with Idaho's TMDL schedule. This assessment describes the physical, biological, and cultural setting; water quality status; pollutant sources; and recent pollution control actions in the American Falls Subbasin located in southeast Idaho. The first part of this document, the subbasin assessment, is an important first step in leading to the TMDL. The starting point for this assessment was Idaho's current 303(d) list of water quality limited waterbodies. Ten segments of the American Falls Subbasin were listed on this list. The subbasin assessment portion of this document examines the current status of 303(d)-listed waters, and defines the extent of impairment and causes of water quality limitation throughout the subbasin. The loading analysis quantifies pollutant sources and allocates responsibility for load reductions needed to return listed waters to a condition of meeting water quality standards.

American Falls Subbasin covers 2,869 square miles (1.8 million acres, 0.75 million hectares) in southeast Idaho. Urban areas within or adjacent to the subbasin are American Falls, Aberdeen, Blackfoot, Firth, and Shelley. Much of the subbasin lies within the Fort Hall Indian Reservation. Major land uses include dryland and irrigated agriculture, and livestock grazing. American Falls Reservoir is the predominant waterbody in the subbasin and provides both irrigation water and electricity. Major subbasin tributaries to the reservoir include Snake River from the reservoir to Bingham-Bonneville county line, Spring Creek, McTucker Creek, Danielson Creek, Bannock Creek, and Ross Fork.

Historically, American Falls Subbasin waterbodies sustained several beneficial uses (Table ES-1). All streams supported coldwater aquatic life, agriculture and industrial water supply, aesthetics, and wildlife habitat as well as secondary contact recreation with the bigger streams also supporting primary contact recreation. Most streams also maintained spawning populations of salmonids. Domestic water supply has been officially declared a designated use in Snake River and American Falls Reservoir. Current information suggests that some beneficial uses, such as coldwater aquatic life and salmonid spawning, are impaired and are not fully supported in several waterbodies in the subbasins.

There are ten water quality segments listed on the 1998 303(d) list (Table ES-1). In addition to American Falls Reservoir, three streams, which flow into the reservoir, are on the list – Snake River, McTucker Creek, and Bannock Creek. The remaining listed waterbodies are tributaries of Bannock Creek and include Moonshine Creek, Rattlesnake Creek, West Fork Bannock Creek, and Knox Creek.

The current list of water quality limited waterbodies includes streams from previous lists and those added to the 1998 list. All streams listed prior to 1998 had sediment, nutrients, or both listed as a pollutant of concern (Table ES-1). Dissolved oxygen and flow alteration were identified as problems in American Falls Reservoir and Snake River. Bannock Creek was also on the list for bacteria concerns. For Knox Creek, which was added to the list in 1998, pollutants of concern were listed as unknown. Key beneficial uses affected by these pollutants are coldwater aquatic life, salmonid spawning, and contact recreation.

Several sources of pollutants have been identified in American Falls Subbasin. Agriculture has been positively related to both nutrient and sediment loading. Stormwater runoff is also a source of both sediments and nutrients. Other likely contributors to sediment loading in subbasin streams are livestock practices; stream channels and banks; and roads. Windblown sediment and shoreline erosion add to sediment loading in American Falls Reservoir. In addition to agriculture and stormwater, wastewater treatment plants are a source of nutrients in the subbasin. Waterfowl add to nutrient loading, primarily in the reservoir. Another source of phosphorus in the reservoir is bottom sediments, which add to overall phosphorus loading through internal recycling. Other possible contributors of nutrients include livestock grazing, recreation, and failed septic systems.

Table ES-1. Water quality limited segments in American Falls Subbasin on the 303(d) list including listed pollutants and beneficial uses.

Waterbody	Water quality limited segment boundary		Listed pollutants[1]	Beneficial uses[2]				
	Lower	Upper		Cold water aquatic life	Salmonid spawning	Contact recreation		Domestic water
						Primary	Secondary	
American Falls Reservoir			DO, Flow Alt, Nut, Sed	D		D	P	D
Snake River	American Falls Reservoir	Ferry Butte	Sed	D	D	D	P	D
	Ferry Butte	Bingham-Bonneville county line	DO, Flow Alt, Nut, Sed	D	D	D	P	D
McTucker Creek	Snake River	Headwaters	Sed	P			P	
Bannock Creek	American Falls Reservoir	Reservation boundary	Bact, Nut, Sed	D	E		D	
	Reservation boundary	Headwaters	Bact, Nut, Sed	D	E		D	
Moonshine Creek	Reservation boundary	Headwaters	Sed	P			P	
Rattlesnake Creek	Reservation boundary	Headwaters	Sed	P			P	
West Fork Bannock Creek	Reservation boundary	Headwaters	Sed	P			P	
Knox Creek	Bannock Creek	Headwaters	Unknown	P			P	

[1]DO=dissolved oxygen, Flow Alt=flow alteration, Nut=nutrients, Sed=sediment, Bact=bacteria

[2]D=designated in State Water Quality Standards, P=use not designated so presumed to support use, E=existing use; all waterbodies are considered to support agricultu and industrial water supply, wildlife habitat, and aesthetics; beneficial use information from the Idaho Water Quality Standards and Wastewater Treatment Requiremer and Beneficial Use Reconnaissance Program monitoring

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From a geographical perspective, a major contributor of both nutrients and sediment to American Falls Reservoir is an out-of-subbasin tributary, Portneuf River.

There are thirteen NPDES dischargers within American Falls Subbasin. Four are wastewater treatment plants at Aberdeen, Blackfoot, Firth, and Shelley. Four permits relate to fish hatcheries with Crystal Springs holding three permits and Indian Springs holding one permit. The other five NPDES permits relate to large confined animal feeding operations – Snake River Cattle Company, Tom Anderson Cattle Company, Bragg feedlot, Kerry Ward feedlot, and Alan Andersen dairy.

Load allocations (quantity of pollutants a stream can assimilate without impairing beneficial uses) were based on target concentrations chosen such that attainment of the target would result in meeting beneficial uses. Although phosphorus is most likely the limiting nutrient in American Falls Reservoir, targets were recommended for both phosphorus and nitrogen. The targets for total phosphorus and total nitrogen were set at 0.05 and 0.85 mg/L, respectively, for tributaries to the reservoir and point sources. A total inorganic nitrogen, rather than total nitrogen, target was established in Portneuf River for consistency with prior load allocation recommendations. No load allocations were placed on the reservoir although an average chlorophyll a concentration for July and August not to exceed 0.015 mg/L was suggested. An average concentration not to exceed 60 mg/L of suspended sediment over a 14-day period was recommended for waterbodies in American Falls Subbasin listed for sediment problems, except for Bannock Creek watershed. For Bannock Creek and tributaries, a surrogate sediment target of 80% streambank stability was used to develop load allocations.

Load allocations were not established for flow alteration, dissolved oxygen (DO), or bacteria. For flow alteration, it is not considered a pollutant, and TMDLs need to be written only for pollutants. Data did not indicate dissolved oxygen was a problem in Snake River, and it was assumed that control of nutrients and subsequent reduction in algal densities will lead to observance of water quality standards for dissolved oxygen in the reservoir. Data were insufficient to conclude contact recreation impairment by bacteria in Bannock Creek, so a plan was recommended to collect necessary data to determine beneficial use support.

TMDLs must also include a margin of safety and consider seasonality in the analysis. In TMDLs for American Falls Subbasin, the choice of conservative targets results in an inherent margin of safety when estimating load and wasteload allocations. Seasonality was only considered in the establishment of the chlorophyll a target for the reservoir, which is based on a July and August average. It is during these months that recreational use is high as is the potential for growth of aquatic vegetation.

The amount and periodicity of data varied by waterbody. Load allocations were thus based on available data. Most of the data used to calculate loads were collected since 2000 and generally reflect drought conditions in southeast Idaho. Discharge Monitoring Reports (DMRs) provided the basis for estimating wasteloads for NPDES permit holders.

Loading Analysis

A quick overview of both listed and unlisted waterbodies, and point sources, for which load and wasteload allocations were recommended is as follows:

American Falls Reservoir – This waterbody is listed for flow alteration, DO, nutrients, and sediment (Table ES-1). As mentioned, no TMDLs were prepared for waterbodies affected by flow alteration. No data were reviewed to indicate sediment was impairing beneficial uses in the reservoir, so no TMDL was done. The reservoir has a history of algae problems exacerbated by nutrient loading to the reservoir. The primary beneficial use affected is coldwater aquatic life. Sources of nutrients into the reservoir include: tributaries, springs, and drains; waterfowl; and internal recycling of phosphorus. A goal of an average (July and August) concentration not to exceed 0.015 mg/L of chlorophyll *a* was set for the reservoir with the assumption that attainment of this target will lead to observance of water quality standards for dissolved oxygen and support of coldwater aquatic life beneficial use. A rudimentary model was employed to examine effects of suggested reductions in phosphorus loading to the reservoir. The model predicts that with recommended phosphorus load allocations average concentration of chlorophyll *a* will meet the target concentration of 0.015 mg/L and DO water quality standards will be supported, except in the highest of water years. This reservoir should be scheduled for future Beneficial Use Reconnaissance Program (BURP) monitoring to determine support of beneficial uses.

Snake River – American Falls Reservoir to Ferry Butte – This water quality limited segment is listed for sediment (Table ES-1). No data were reviewed to suggest sediment is impairing beneficial uses in this reach; however, the effect of bedload and water column sediment in average to high water years is unknown. Until such data are collected, or BURP assessment indicates beneficial use support, it is assumed that sediment is impairing beneficial uses in the reach. Beneficial uses possibly affected are coldwater aquatic life and salmonid spawning. Eroding streambanks are a source of sediment in this reach. Other possible sediment sources are agriculture, livestock grazing, and instream channel. The load allocation for suspended sediment as measured at the USGS gage at Ferry Butte (13069500) is 72,074 tons/year (Table ES-2). As the receiving water of this reach is American Falls Reservoir, load allocations were established for both phosphorus and nitrogen. Annual load allocations at the USGS Ferry Butte gage are 167 tons of total phosphorus and 1,918 tons of total nitrogen. This stream segment should be scheduled for future BURP monitoring to determine support of beneficial uses.

Snake River – Ferry Butte to Bingham-Bonneville county line – This water quality limited segment is listed for flow alteration, DO, nutrients, and sediment (Table ES-1). As mentioned, no TMDLs were prepared for stream reaches affected by flow alteration. Data do not indicate that DO levels are violating water quality standards, thus no TMDL was written for dissolved oxygen. No data were reviewed to suggest sediment is

Table ES-2. Load and wasteload allocations for phosphorus, nitrogen, and sediment for American Falls Subbasin waterbodies and point sources.

Waterbody	Site	Total phosphorus (tons/year)				Total nitrogen (tons/year)				TIN[1] (tons/year)		Nitrate+nitrite (tons/year)		Suspended sediment (tons/year)			
		Annual load		Annual wasteload		Annual load		Annual wasteload		Annual load		Annual wasteload		Annual load		Annual wasteload	
		Allo-cation	Reduc-tion	Allo-cation	Reduc-tion	Allo-cation	Reduc-tion	Alloc-ation	Reduc-tion	Allo-cation	Reduc-tion	Allo-cation	Reduc-tion	Allo-cation	Reduc-tion	Allo-cation	Reduc-tion
303(d) listed waterbodies																	
Snake River	nr Blackfoot USGS gage[2]	167	0			1,918	0							72,074	0		
	at Blackfoot USGS gage	146	0			1,649	0							34,619	0		
	nr Shelley USGS gage	171	0			2,066	0							34,573	0		
Bannock Creek		2.6	3.9			43	19							948	99		
Moonshine Creek														168	218		
Rattlesnake Creek														307	327		
West Fork Bannock Creek														55	0		
McTucker Creek		6.5	0.0			164	68							1,439	0.0		
Portneuf River[3]	Tyhee USGS gage	22	365							348	796						
Non 303(d) listed waterbodies																	
Clear Creek		1.07	0.00			31.2	32.6										
Danielson Creek		1.92	0.00			47.1	6.7							627	0		
Hazard Creek (Little Hole Draw)		0.82	3.26			14.0	32.9							164	0		
Seagull Bay tributary		0.27	0.89			4.3	0.0										
Spring Creek		8.62	0.00			299	92										
Sunbeam Creek		0.22	0.85			3.7	0.6							261	153		
Cedar spillway		0.36	0.00			4.2	0.0										
Colburn wasteway		0.26	0.03			4.4	2.9										
Crystal springs		2.32	0.00			41.1	58.1										
Nash spill		0.009	0.00			0.1	0.0										
R spill		0.003	0.00			0.03	0.00										
Spring Hollow		0.26	0.48			4.4	47.4										
Sterling wasteway		0.27	0.17			4.6	4.5										
Point sources																	
Aberdeen WWTP				0.03	0.79			0.5	5.6							7.3	0.0
Blackfoot WWTP				9.46	0.00			55.9	0.0							72.5	0.0
Firth WWTP				0.49	0.00			3.0	0.0							8.0	0.0
Shelley WWTP				1.28	0.00			7.2	0.0							21.0	0.0
Crystal Springs Trout Farm				1.22	0.00			6.7	0.0							61.1	0.0
City of Blackfoot stormwater runoff				0.33	0.00							0.10	0			21.9	68.0

[1]TIN=total inorganic nitrogen (nitrate+nitrite+ammonia)
[2]this gage site is actually at Ferry Butte and Tilden Bridge
[3]Portneuf River is not on the 303(d) list under American Falls Subbasin, but is on the 303(d) list under its own subbasin

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impairing beneficial uses in this reach; however, the effect of bedload and water column sediment in average to high water years is unknown. Until such data are collected, or BURP assessment indicates beneficial support, it is assumed that sediment is impairing beneficial uses in the reach. Beneficial uses possibly affected are coldwater aquatic life and salmonid spawning. Stormwater runoff from the City of Blackfoot and agriculture are sources of sediment. Additional sediment sources may include the livestock grazing and streambanks. The load allocations for suspended sediment as measured at the USGS gages at Blackfoot (13062500) and near Shelley (13060000) are 34,619 and 34,573 tons/year, respectively (Table ES-2). Nutrients do not appear to be impairing beneficial uses in Snake River, but as the river discharges to American Falls Reservoir, load allocations were established for both phosphorus and nitrogen. Wastewater treatment plants (WWTP) in Blackfoot, Firth, and Shelley, as well as City of Blackfoot stormwater runoff, contribute nutrients to Snake River in this reach. Other possible nutrient sources include agriculture and livestock. Annual load allocations at USGS gage sites at Blackfoot and near Shelley are 146 and 171 tons of total phosphorus and 1,649 and 2,066 tons of total nitrogen, respectively. This stream segment should be scheduled for future BURP monitoring to determine support of beneficial uses.

Bannock Creek – American Falls Reservoir to Reservation Boundary – This water quality limited segment is listed for bacteria, nutrients, and sediment (Table ES-1). Data were incomplete to confirm violations of water quality standards for *E. coli*; therefore, no TMDL was written for bacteria. It was recommended that DEQ and Shoshone-Bannock Tribes cooperate in a sampling effort to confirm bacteria standards violations. No data were reviewed as to support of beneficial uses in this water quality limited segment of Bannock Creek. The beneficial use most likely affected is coldwater aquatic life. Load allocations were established for both nutrients and sediment. Land management activities (e.g., agriculture and livestock grazing) are major sources of nutrients into mainstem Bannock Creek. Nutrient load allocations are 2.6 and 43 tons/year for total phosphorus and total nitrogen, respectively. Possible sources of sediment include agriculture, livestock grazing, and roads. Additional sediment sources may include the instream channel and streambanks. The Generalized Watershed Loading Functions (GWLF) model was used to establish a sediment load for Bannock Creek in comparison to streambank stability and water column sediment data from West Fork Bannock Creek, which served as a reference for Bannock Creek watershed streams. The annual load allocation for sediment is 948 tons (Table ES-2). This stream segment should be scheduled for future BURP monitoring to determine support of beneficial uses.

Bannock Creek – Reservation boundary to headwaters – This water quality limited segment is listed for bacteria, nutrients, and sediment (Table ES-1). Data were incomplete to confirm violations of water quality standards for *E. coli*; therefore, no TMDL was written for bacteria. It was recommended that DEQ and Shoshone-Bannock Tribes cooperate in a sampling effort to confirm bacteria standards violations. Assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial use affected is coldwater aquatic life. Load allocations were not stratified based on water quality limited segment, i.e., only one overall load allocation

for each pollutant was recommended (see Bannock Creek – American Falls Reservoir to Reservation boundary above for nutrient and sediment load allocations).

Moonshine Creek – This tributary to Bannock Creek is listed on the 303(d) list for sediment (Table ES-1). No data were reviewed as to support of beneficial uses in Moonshine Creek. The beneficial use most likely affected is coldwater aquatic life. Possible sources of sediment include agriculture, livestock grazing, and roads. Additional sediment sources may include the instream channel and streambanks. The GWLF model was used to establish a sediment load for Moonshine Creek in comparison to streambank stability and water column sediment data from West Fork Bannock Creek, which served as a reference for Bannock Creek watershed streams. The annual load allocation for sediment is 168 tons (Table ES-2). This stream should be scheduled for future BURP monitoring to determine support of beneficial uses.

Rattlesnake Creek – This tributary to Bannock Creek is listed on the 303(d) list for sediment (Table ES-1). Assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial use affected is coldwater aquatic life. Possible sources of sediment include agriculture, livestock grazing, and roads. Additional sediment sources may include the instream channel and streambanks. The GWLF model was used to establish a sediment load for Rattlesnake Creek in comparison to streambank stability and water column sediment data from West Fork Bannock Creek, which served as a reference for Bannock Creek watershed streams. The annual load allocation for sediment is 307 tons (Table ES-2).

West Fork Bannock Creek – This tributary to Bannock Creek is listed on the 303(d) list for sediment (Table ES-1). No data were reviewed as to support of beneficial uses in West Fork. This tributary presently displays significant water quality and habitat improvement. These improvements are directly related to the management measures (fencing of riparian corridor) that have been implemented in the subwatershed. This improvement in water and habitat quality is deemed significant enough to consider West Fork a viable target in the GWLF model for gaging the level of improvement necessary in other 303(d) listed waterbodies within Bannock Creek watershed. The annual load allocation for sediment is 55 tons (Table ES-2). This stream should be scheduled for future BURP monitoring to determine support of beneficial uses.

Knox Creek – This tributary to Bannock Creek is listed on the 303(d) list for unknown pollutants (Table ES-1). Assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial use affected is coldwater aquatic life. Possible pollutant sources are agriculture and livestock grazing. Additional sediment sources may include the instream channel, streambanks, and roads. No data were available to indicate nutrients are affecting beneficial uses, although the overall nutrient load allocation for Bannock Creek would encompass Knox Creek. An individual load allocation for sediment was not made for Knox Creek, but is part of the overall sediment load allocation for Bannock Creek (see Bannock Creek – American Falls Reservoir to Reservation boundary). More data are needed to determine what is causing impairment of beneficial uses in Knox Creek.

McTucker Creek – This stream is listed on the 303(d) list for sediment (Table ES-1). Assessment of BURP data indicates the stream is not supporting its beneficial uses. Beneficial uses affected are coldwater aquatic life and salmonid spawning. Possible sources of sediment are historic activities, livestock grazing, instream channel, and streambanks. The annual load allocation for sediment is 1,439 tons (Table ES-2). As this stream contributes to nutrients in American Falls Reservoir, load allocations were recommended for phosphorus and nitrogen. Total phosphorus and total nitrogen load allocations are 6.5 and 164 tons/year, respectively.

Danielson Creek – This stream is not on the 303(d) list, but assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial uses affected are coldwater aquatic life and salmonid spawning. It is unknown what is causing impairment of beneficial uses in Danielson Creek so load allocations are recommended for both nutrients and sediment. In addition, Danielson Creek is a source of nutrients into American Falls Reservoir. Possible pollutant sources are agriculture and livestock grazing. Additional sediment sources may include the instream channel and streambanks. Total phosphorus and total nitrogen load allocations are 1.92 and 47.1 tons/year, respectively (Table ES-2). The annual load allocation for sediment is 627 tons.

Hazard Creek/Little Hole Draw – This stream is not on the 303(d) list, but assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial uses affected are coldwater aquatic life and salmonid spawning. It is unknown what is causing impairment of beneficial uses in Hazard Creek/Little Hole Draw so load allocations are recommended for both nutrients and sediment. In addition, Hazard Creek/Little Hole Draw is a source of nutrients into American Falls Reservoir. Aberdeen WWTP contributes nutrients and some sediment to the creek. Other possible pollutant sources are agriculture, livestock grazing, and urban activities. Additional sediment sources may include the instream channel and streambanks. Total phosphorus and total nitrogen load allocations are 0.82 and 14.0 tons/year, respectively (Table ES-2). The annual load allocation for sediment is 164 tons.

Sunbeam Creek – This stream is not on the 303(d) list, but assessment of BURP data indicates the stream is not supporting its beneficial uses. The primary beneficial use affected is coldwater aquatic life. It is unknown what is causing impairment of beneficial uses in Sunbeam Creek so load allocations are recommended for both nutrients and sediment. In addition, Sunbeam Creek is a source of nutrients into American Falls Reservoir. Possible pollutant sources are agriculture and livestock grazing. Additional sediment sources may include the instream channel and streambanks. Total phosphorus and total nitrogen load allocations are 0.22 and 3.7 tons/year, respectively (Table ES-2). The annual load allocation for sediment is 261 tons.

Clear Creek – This stream is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus and total nitrogen load allocations are 1.07 and 31.2 tons/year, respectively (Table ES-2). This stream should be scheduled for future BURP monitoring to determine support of beneficial uses.

Seagull Bay tributary – This stream is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus and total nitrogen load allocations are 0.27 and 4.3 tons/year, respectively (Table ES-2). This stream should be scheduled for future BURP monitoring to determine support of beneficial uses.

Spring Creek – This stream is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus and total nitrogen load allocations are 8.62 and 299 tons/year, respectively (Table ES-2). This stream should be scheduled for future BURP monitoring to determine support of beneficial uses.

Cedar spillway – This agricultural return drain is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus and total nitrogen load allocations are 0.36 and 4.2 tons/year, respectively (Table ES-2).

Colburn wasteway – This agricultural return drain is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus and total nitrogen load allocations are 0.26 and 4.4 tons/year, respectively (Table ES-2).

Crystal springs – This waterbody is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus and total nitrogen load allocations are 2.32 and 41.1 tons/year, respectively (Table ES-2).

Nash spill – This agricultural return drain is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus and total nitrogen load allocations are 0.009 and 0.1 tons/year, respectively (Table ES-2).

R spill – This agricultural return drain is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus and total nitrogen load allocations are 0.003 and 0.03 tons/year, respectively (Table ES-2).

Spring Hollow – This waterbody is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus and total nitrogen load allocations are 0.26 and 4.4 tons/year, respectively (Table ES-2).

Sterling wasteway – This agricultural return drain is not on the 303(d) list, but does contribute to nutrient loads in American Falls Reservoir. Total phosphorus and total nitrogen load allocations are 0.27 and 4.6 tons/year, respectively (Table ES-2).

Portneuf River – This stream is on the 303(d) list and a TMDL has already been approved for the Portneuf River Subbasin. The river contributes to nutrient loads in American Falls Reservoir. The total phosphorus load allocation is 22 tons/year (Table ES-2). For consistency with the Portneuf River Subbasin TMDL, a load allocation for total inorganic nitrogen was set at 348 tons/year.

Aberdeen wastewater treatment plant – This point source contributes nutrients and some sediment to Hazard Creek/Little Hole Draw, and ultimately to American Falls Reservoir. Nutrient wasteload allocations are 0.03 and 0.5 tons/year for total phosphorus and total nitrogen, respectively (Table ES-2). The annual wasteload

allocation for sediment is 7.3 tons. Nutrient wasteload allocations require a reduction of current estimated wasteloads while the sediment wasteload allocation does not.

Blackfoot wastewater treatment plant – This point source contributes nutrients and some sediment to Snake River, and ultimately to American Falls Reservoir. Nutrient wasteload allocations are 9.46 and 55.9 tons/year for total phosphorus and total nitrogen, respectively (Table ES-2). The annual wasteload allocation for sediment is 72.5 tons. Neither nutrient nor sediment wasteload allocations require a reduction of current estimated wasteloads.

Firth wastewater treatment plant – This point source contributes nutrients and some sediment to Snake River, and ultimately to American Falls Reservoir. Nutrient wasteload allocations are 0.49 and 3.0 tons/year for total phosphorus and total nitrogen, respectively (Table ES-2). The annual wasteload allocation for sediment is 8.0 tons. Neither nutrient nor sediment wasteload allocations require a reduction of current estimated wasteloads.

Shelley wastewater treatment plant – This point source contributes nutrients and some sediment to Snake River, and ultimately to American Falls Reservoir. Nutrient wasteload allocations are 1.28 and 7.2 tons/year for total phosphorus and total nitrogen, respectively (Table ES-2). The annual wasteload allocation for sediment is 21.0 tons. Neither nutrient nor sediment wasteload allocations require a reduction of current estimated wasteloads.

Crystal Springs Trout Farm – This point source contributes nutrients and some sediment that ultimately reach American Falls Reservoir. Nutrient wasteload allocations are 1.22 and 6.7 tons/year for total phosphorus and total nitrogen, respectively (Table ES-2). The annual wasteload allocation for sediment is 61.1 tons. Neither nutrient nor sediment wasteload allocations require a reduction of current estimated wasteloads.

City of Blackfoot stormwater runoff – This point source contributes nutrients and sediment to Snake River, and ultimately to American Falls Reservoir. The total phosphorus load allocation is 0.33 tons/year (Table ES-2). As data for total nitrogen were not available, but nitrate+nitrite data were, the wasteload allocation for nitrogen is set at 0.10 tons/year of nitrate+nitrite. The annual wasteload allocation for sediment is 21.9 tons. Nutrient wasteload allocations do not require a reduction of current estimated wasteloads while the sediment wasteload allocation does.

Waterbodies Recommended for Delisting

Information used to prepare this document justifies the delisting of pollutants for several waterbodies in the subbasin. No data were reviewed to indicate sediment was affecting beneficial uses in American Falls Reservoir. Monitoring of dissolved oxygen in Snake River showed no violations of water quality standards. Levels of nutrients observed in Snake River were low compared to target concentrations used to establish load allocations. Thus, it is

recommended that for future 303(d) lists, American Falls Reservoir be delisted for sediment, and Snake River be delisted for dissolved oxygen and nutrients.

Possible Additions to 303(d) List

Data examined during preparation of the TMDL imply possible impairment of beneficial uses due to pollutants additional to those on the 303(d) list. Violations of water quality standards for temperature in both American Falls Reservoir and Snake River were documented. Both waterbodies should have temperature included on future 303(d) lists.

Assessment of BURP data indicated several other non 303(d)-listed streams not supporting their beneficial uses. The following did not support coldwater aquatic life and/or salmonid spawning in at least a portion of the watershed and should be considered for inclusion on future 303(d) lists: Danielson Creek, Hazard Creek (Little Hole Draw), and Sunbeam Creek.

Data Gaps

Several aspects of the TMDL would be improved with additional data. These data would serve to better refine links between pollutants and beneficial uses, natural background levels, more appropriate targets, and better estimates of load allocations. The following is by no means an exhaustive list of all data needs in the American Falls Subbasin:

- natural background levels of nutrients and sediment,
- nutrient and sediment data from average and above average water years,
- refinement of nutrient levels necessary to support beneficial uses,
- contribution of springs to reservoir nutrient loads,
- bathymetric data from American Falls Reservoir,
- better estimates of internal phosphorus loading in American Falls Reservoir,
- increased sampling of the reservoir to include more sites over a longer period (e.g., April through September),
- sediment bedload data from average to above average water years in subbasin streams, especially Snake River,
- complete survey of streambank stability in Bannock Creek watershed streams,
- additional water quality information from tributaries on the Fort Hall Indian Reservation,
- regular stream flow information throughout the year for tributaries,
- bacteria sampling in Bannock Creek,
- ambient monitoring above and below wastewater treatment plant effluent discharges, and
- identification of pollutant sources in the subbasin.

Implementation Strategies

Any implementation plan will concentrate on reducing nutrients and sediment. For point sources such as wastewater treatment plants, it is expected that future NPDES permits will include recommended limitations on nutrients. Reduction in pollutant loadings for nonpoint

sources will most likely require a mix of policy changes, program initiatives, and implementation of Best Management Practices.

Certain state agencies have been designated to work with particular industries that have the potential for contributing nonpoint source pollutants. For example, the Idaho Soil Conservation Commission has the responsibility to work with agriculture and the livestock industry on development of their implementation plan to meet recommendations set out in the American Falls Subbasin TMDL.

No timelines are presented as to when water quality will improve to the point of supporting beneficial uses. Such dates are dependent on a myriad of factors such as financial support, landowner cooperation, and geological processes (e.g., sufficient stream flows to mobilize sediment and move it out of the system). The hope would be so see some significant changes toward meeting the goals of the TMDL within ten years.

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